

Measurement Challenges for Carbon Nanotube Material

Sivaram Arepalli
ERC@NASA-Johnson Space Center
Houston, TX 77058

sivaram.arepalli-1@nasa.gov

Abstract

The advances in large scale applications of carbon nanotubes demand a reliable supply of raw and processed materials. It is imperative to have a consistent quality control of these nanomaterials to distinguish material inconsistency from the modifications induced by processing of nanotubes for any application. NASA Johnson Space Center realized this need five years back and started a program to standardize the characterization methods. The JSC team conducted two workshops (2003 and 2005) in collaboration with NIST focusing on purity and dispersion measurement issues of carbon nanotubes [1]. In 2004, the NASA-JSC protocol was developed by combining analytical techniques of SEM, TEM, UV-VIS-NIR absorption, Raman, and TGA [2]. This protocol is routinely used by several researchers across the world as a first step in characterizing raw and purified carbon nanotubes. A suggested practice guide consisting of detailed chapters on TGA, Raman, electron microscopy and NIR absorption is in the final stages and is undergoing revisions with input from the nanotube community [3]. The possible addition of other techniques such as XPS, and ICP to the existing protocol will be presented. Recent activities at ANSI and ISO towards implementing these protocols as nanotube characterization standards will be discussed.

- Ref.: 1) <http://mmptdpublic.jsc.nasa.gov/jsnano/>
2) Arepalli S., Nikolaev P., Gorelik O., Hadjiev V. G., Holmes W. A., Files B. S., and Yowell L., "Protocol for the Characterization of Single-Wall Carbon Nanotube Material Quality", Carbon, Vol. 42, pp. 1783-1791 (2004).
3) http://www.msel.nist.gov/Nanotube2/Carbon_Nanotubes_Guide.htm